

*Apollo 11 at 50: What did we learn,
and what are we learning?*



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Earth and Moon as seen by the LRO Spacecraft 10/12/15



How did we get to the Moon?



October 1, 1957



How did we get to the Moon?



October 1, 1957

4306 days



July 16, 1969



How did we get to the Moon?



- 1955 March: Feasibility of a million pound-thrust liquid-fueled rocket established
- 1957 October 1: Launch of Sputnik 1
- 1958
 - January 31: Explorer 1, the first US satellite, is launched
 - April 1: The Yerkes Observatory is selected by the Air Force to map the Moon
 - October 1: NASA officially takes over from NACA to lead the US civilian space program
- 1959
 - April 9: The first group of US astronauts selected
 - September 12: Lunik II launched, crashes on the Moon 35 hours later
 - October 7: Lunik III images the farside of the Moon for the first time



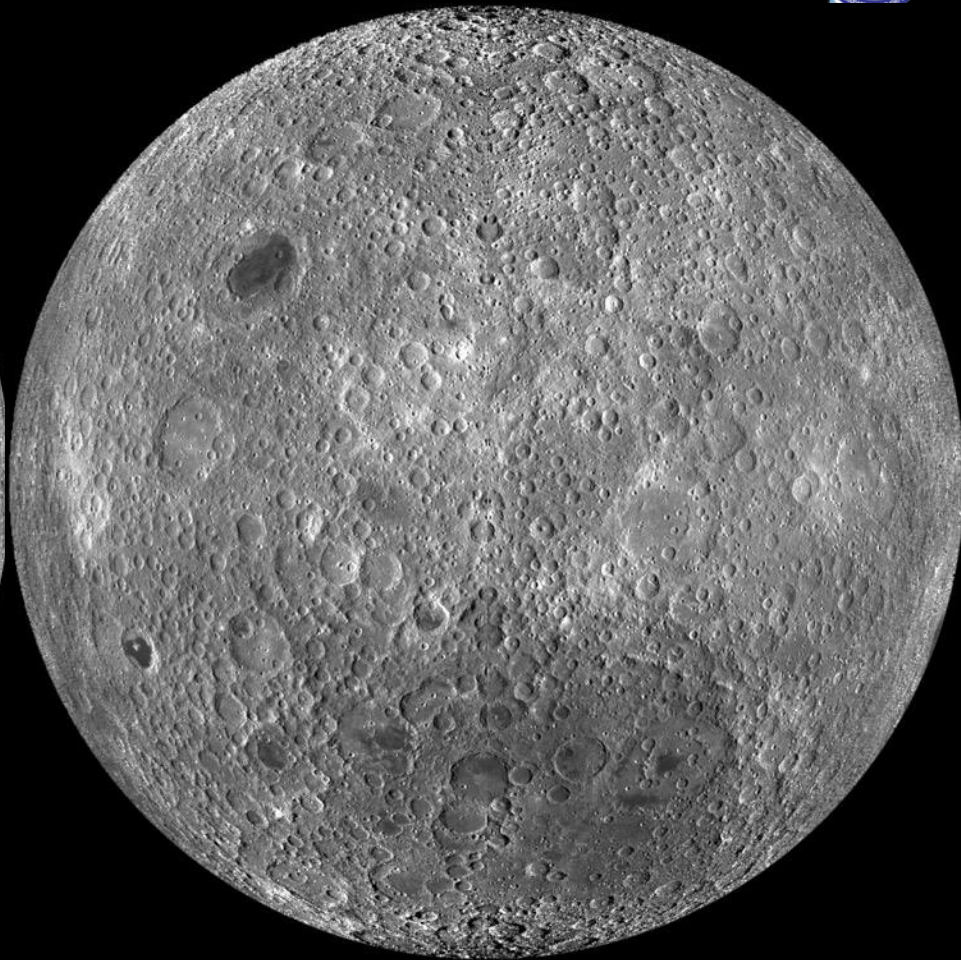
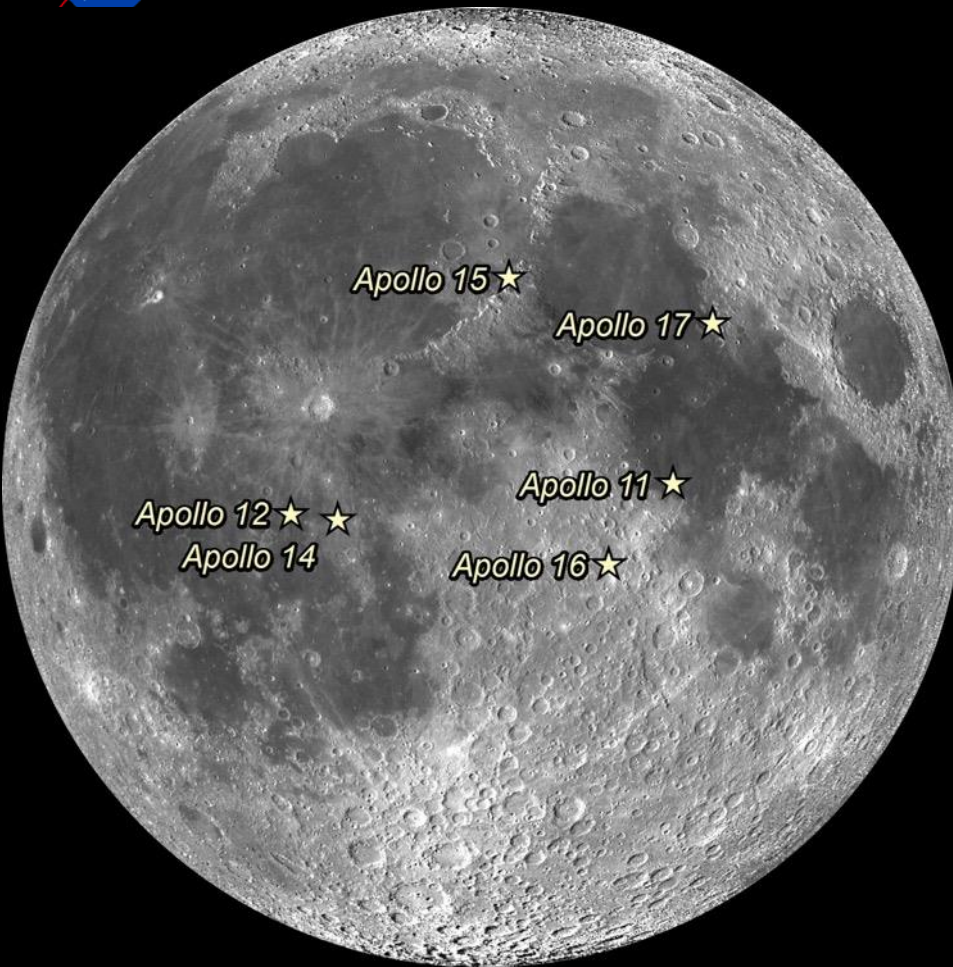


How did we get to the Moon?



- 1960
 - January: Apollo suggested as a name for the Mercury follow-on program
 - April-May: Guidelines for a three crew member spacecraft outlined
 - July 25: Apollo selected as the name of the advanced human space flight program
- 1961
 - April 12: Yuri Gagarin orbits the Earth
 - April 20: JFK sends a memo to LBJ “Is there any... space program which promises dramatic results in which we could win?”
 - April 28: LBJ responds by stating that “Manned (sic) exploration of the [M]oon, for example, is not only an achievement with great propaganda value, but it is essential as an objective whether or not we are first in its accomplishment – and we may be first.” and that the US could land on the Moon by 1966 or 1967.
 - April 29: Werner von Braun in a memo to LBJ “We have an excellent chance of beating the Soviets to the first landing of a crew on the Moon (including return capability, of course).”
 - May 5: Alan Shepard makes first US flight into space
 - May 25: JFK delivers a speech to congress in which he states... “First, I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to earth.”



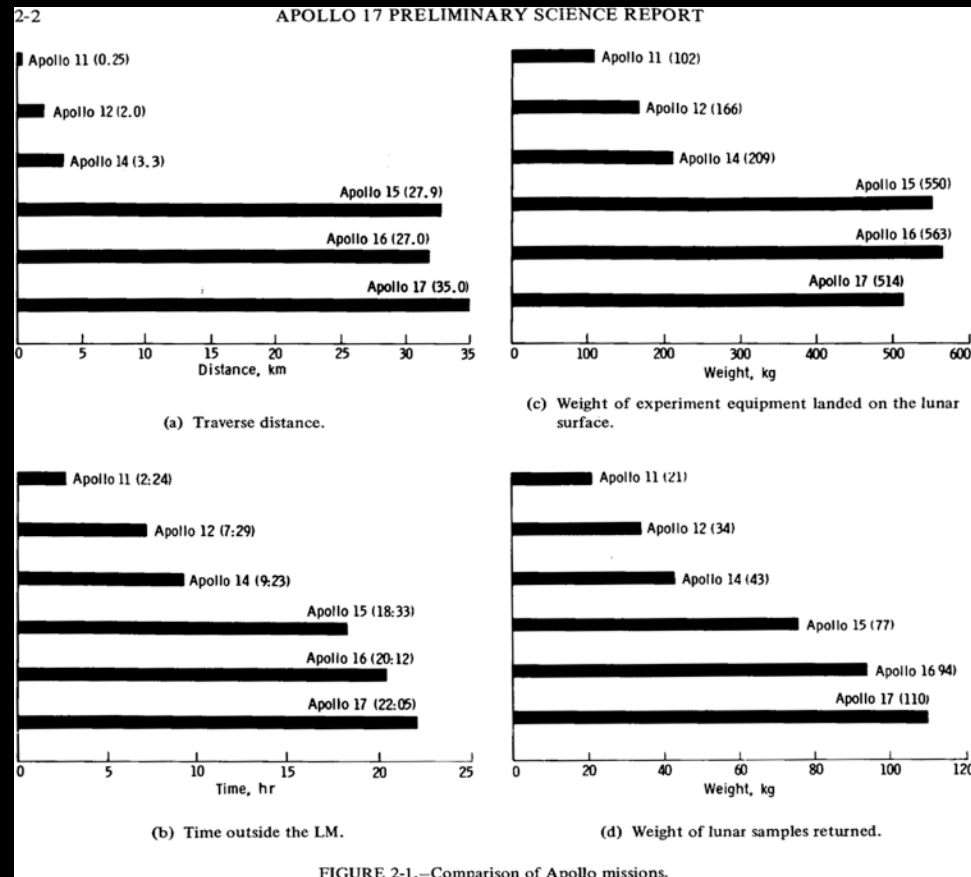




Apollo: By The Numbers



- Apollo 11, a major milestone, was only the first in a progression to more complex, long duration missions
- Let's think of Apollo 11 as an engineering and operations test
- One “experiment” (~74.8 kg) represents the culmination of a decade + of development....



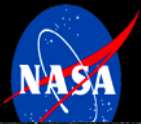


Dr. Harrison H. Schmitt

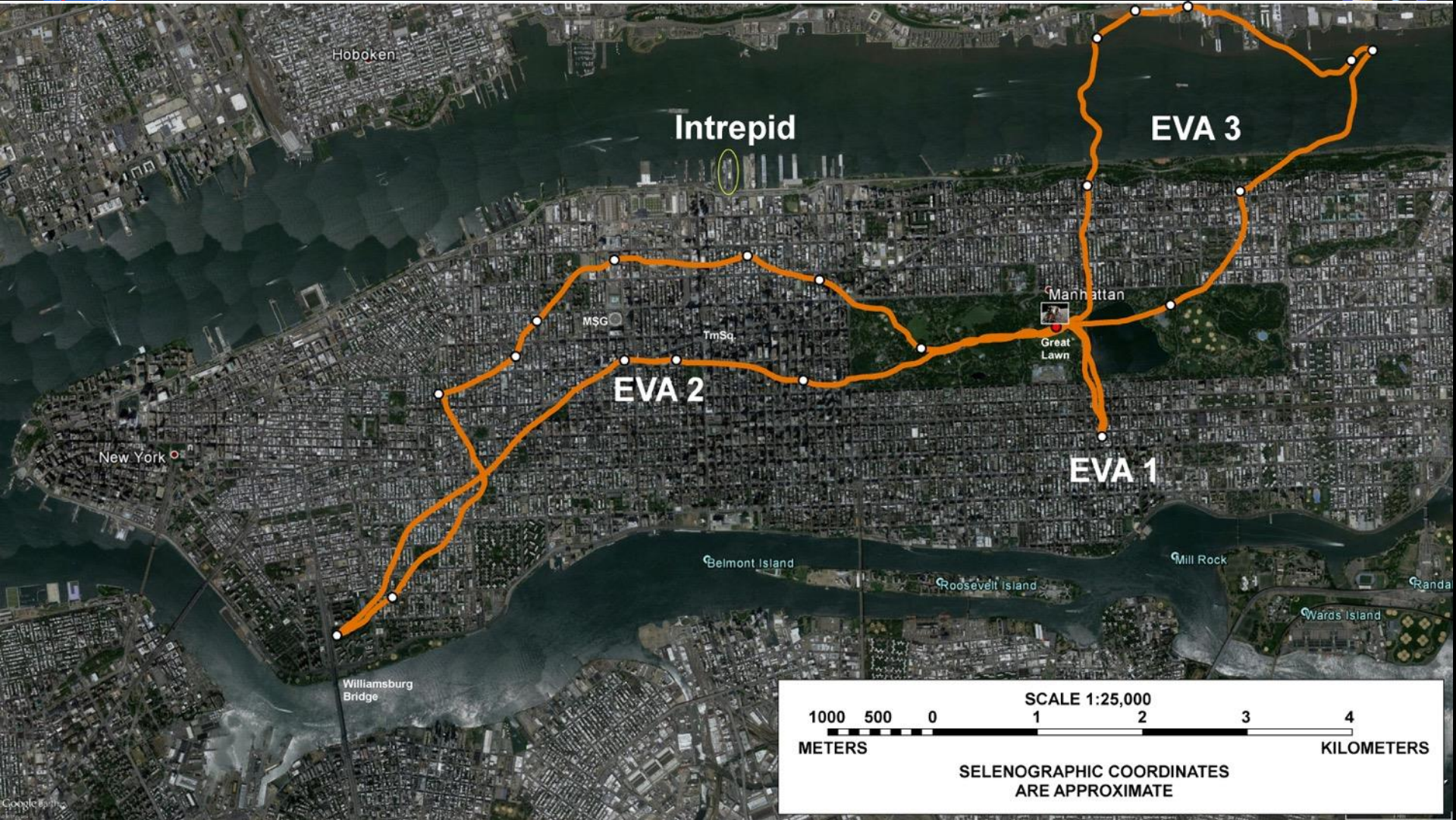


- “Jack”, the only geologist to walk on the Moon, was the 12th and final human to step on the lunar surface
- Selected in the first group of scientist astronauts (almost not sent to the Moon!)
- Assisted in the geologic training for prior missions and participated in the analysis of returned samples and surface investigations





Google earth

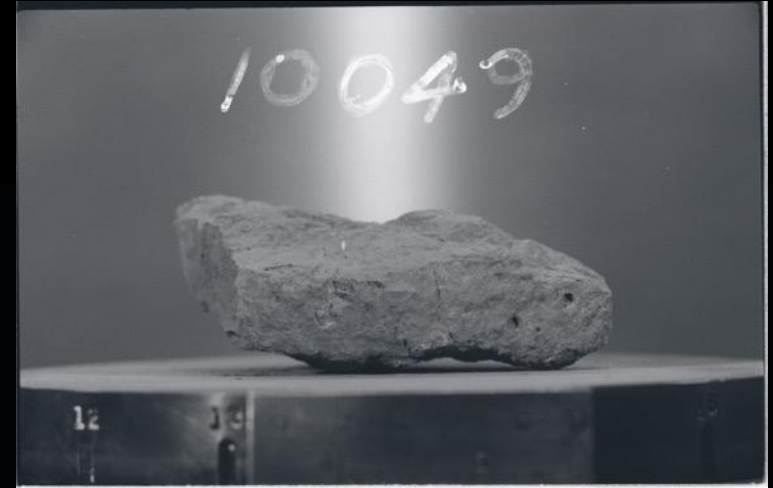




Apollo 11 at 50: A Big (Scientific) Deal



- With the return of samples by Apollo 11 (splashdown on July 24), we entered a new scientific era.
- The 1960s saw two major geologic “revolutions”
 - Plate tectonic theory
 - Lunar samples and planetary science
- We had samples to analyze on Earth, determine the age, composition, properties of a planetary surface, from a known location
- Apollo 11, despite its small “footprint” on the surface, returned samples (particularly the regolith) that revealed a diverse lunar surface
- Each of the subsequent 5 missions answered, and raised, more questions.
 - What is the context for all of the samples?
 - Each sample can tell us something about their exact location, and their surroundings





Revisiting Apollo: 50 years later



- With LRO in orbit, we study the entire Moon, but much of our understanding of the Moon is derived from Apollo (samples and surface experiments)
- Apollo provided edge pieces to the puzzle of the Solar System, we've been filling in the puzzle from there since 1969
- In the intervening 50 years the analytical techniques have improved, we constantly revisit long held assumptions about the Moon





The Moon: Still New After All These Years



- We have a lot to learn about the Moon, from past and present missions, in order to prepare for future missions
- Apollo has left an incredible legacy that we are still understanding, it did not end with Apollo 17
- The Solar System is an amazing, diverse place, and the Moon gives us an opportunity to best understand the processes have shaped all of its solid bodies

